REMARKS

Applicant has carefully reviewed the Office Action mailed June 21, 2011 and offers the following remarks.

Claims 1-5, 7-18, and 20-26 were rejected. Applicant wishes to thank the Examiner for indicating that claims 6 and 19 would be allowable if rewritten in independent form. Applicant reserves the right to rewrite claims 6 and 19 at a later time. However, in light of the remarks below, Applicant believes that all pending claims 1-26 are allowable.

Claims 1-5, 7-18, and 20-26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0096061 to Ji et al. (hereinafter "Ji") in view of Canadian Patent No. 2,404,055 to Walton et al. (hereinafter "Walton"). Applicant respectfully traverses. When rejecting a claim under § 103, the Patent Office must either show that the prior art references teach or suggest all limitations of the claim or explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418, 82 U.S.P.Q.2d (BNA) 1385 (2007).

Before addressing the rejection, Applicant provides a brief summary of the embodiments disclosed in the current application. The disclosed embodiments provide a technique for scheduling data, and in particular, scheduling real-time or voice data for transmissions during a transmit time interval in a multi-carrier communication environment, such as an OFDM communication environment. For each transmit time interval, channel condition indicia for multiple users is determined, and an iterative scheduling process is then implemented based in part on the channel condition indicia. The iterative scheduling initially pre-assigns select tones (such as an OFDM tone) for each of the remaining users that have not been permanently assigned tones for the given transmit time interval. The tones assigned to each user may be assigned in groups corresponding to channels. These channels define available tones throughout the transmit time interval. The transmit time interval is broken into time segments, referred to as blocks, wherein all of the available sub-carriers in the available OFDM spectrum are repeated for each block. Each sub-carrier in the resulting time-frequency continuum is referred to as a tone. If the tones are grouped into channels, channels may include tones over any number of frequencies or blocks. After the iterative scheduling initially pre-assigns select tones for each of the remaining users that have not been permanently assigned tones for the given transmit time

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interval, the remaining user having the least favorable channel conditions is selected as an active user. The newly selected active user is then permanently assigned the select tones that were initially pre-assigned to that particular user. The permanently assigned tones are removed from consideration, and the process is repeated until all the remaining users are permanently assigned unique tones. At this point, scheduling may be initiated.

Claim 1 is representative and recites a method for scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising:

determining channel condition indicia for a plurality of users;

in an iterative manner:

pre-assigning select tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval;

selecting a remaining user having least favorable channel conditions as an active user; and

permanently assigning to the active user the select tones pre-assigned to the active user, wherein once the select tones are permanently assigned to the active user, the active user is no longer a remaining user.

As an initial matter, Applicant respectfully submits that Ji is not prior art to the present application. The present application was filed on September 19, 2006 as a 35 U.S.C. § 371 application based on PCT application PCT/IB05/00772, filed March 24, 2005, and claims priority to a provisional application (Serial No. 60/558,329) filed March 31, 2004. The provisional patent application filed March 31, 2004 provides support for the claimed subject matter of the current application. Thus, the effective filing date of the claims of the present application is March 31, 2004.

Ji was filed on June 1, 2004, after the March 31, 2004 effective filing date of the present application. Ji claims priority to provisional application Serial No. 60/516,557, filed October 30, 2003. Thus, Ji is prior art under 35 U.S.C. § 102(e) only if the portions of Ji used to reject the claims of the present application are supported by the October 30, 2003 provisional application. The Patent Office cites to Figure 6 and paragraphs 0029, 0048, and 0082 of Ji as allegedly teaching certain claim limitations of claim 1 (Office Action mailed June 21, 2011, pp. 3-4). Applicant has reviewed provisional application Serial No. 60/516,557 and does not find the cited portions of Ji in that provisional application. Figure 6 of Ji was not part of the provisional

application, nor is the subject matter of paragraphs 0029, 0048, and 0082 of Ji disclosed in the provisional application. Thus, the subject matter relied upon in Ji to reject the claims is not entitled to the October 30, 2003 filing date of the provisional application, and only has an effective priority date of June 1, 2004, the filing date of Ji. Thus, the portion of Ji relied upon to reject claims 1-5, 7-18, and 20-26 is not prior art to the current application. Since Ji is not prior art, the rejection of claims 1-5, 7-18, and 20-26 under 35 U.S.C. § 103(a) as being obvious over Ji in view of Walton is improper. Since the Patent Office admits that Walton alone without Ji does not teach each and every limitation of claims 1-5, 7-18, and 20-26, claims 1-5, 7-18, and 20-26 are patentable.

Further, even if Ji is considered prior art, a point Applicant does not concede, the combination of Ji and Walton does not teach or suggest performing the claimed pre-assigning, selecting, and permanently assigning steps in an iterative manner as recited in claim 1. The Patent Office alleges that Figure 6 and paragraphs 0029 and 0048 of Ji disclose "pre-assigning select tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval," "selecting a remaining user having least favorable channel conditions as an active user," and "permanently assigning to the active user the select tones pre-assigned to the active user, wherein once the select tones are permanently assigned to the active user, the active user is no longer a remaining user." (Office Action mailed June 21, 2011, pp. 3-4). Applicant respectfully disagrees.

Ji discloses that frequency subbands available for data transmission in a system are partitioned into multiple (e.g., three) disjoint sets (Ji, Abstract). Each sector in the system is assigned one subband set. *Ibid.* Neighboring sectors are assigned different subband sets such that the subband set assigned to each sector is orthogonal to the subband sets assigned to neighboring sectors. *Ibid.* Each sector has an assigned subband set and an unassigned subband set, which contains all subbands not in the assigned set. *Ibid.* Weak users in each sector (which are typically strong interferers to neighboring sectors) are allocated subbands in the assigned set. Strong users in each sector are allocated subbands in the unassigned set. *Ibid.* The weak users in each sector are then orthogonal to strong interferers in neighboring sectors. *Ibid.* As shown in Figure 6, the sector obtains signal quality metrics for all users in the sector and ranks these users based on their signal quality metrics, e.g., in order from the weakest user with the worst signal quality metric to the strongest user with the best signal quality metric (Ji, Figure 6, block 614;

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see also paragraph 0047). Subbands in the set assigned to the sector are then allocated to the users, e.g., in order based on their ranking, until all subbands in the assigned set are allocated (Ji, Figure, block 616; see also paragraph 0048). For example, the weakest user may be allocated subbands in the assigned set first, then the second weakest user may be allocated subbands in the assigned set next, and so on. *Ibid.* Once the assigned set is empty, subbands in the unassigned set are then allocated to remaining users, e.g., in order based on their ranking. *Ibid.* The subband allocation may be performed for one user at a time until all users have been allocated subbands or all subbands in both sets have been allocated. *Ibid.*

However, the cited portions of Ji do not disclose or suggest that select tones are **pre-assigned** to the active user and then are later **permanently assigned** to the active user in an iterative manner, wherein once the select tones are permanently assigned to the active user, the active user is no longer a remaining user, as is required by claim 1. The cited portions of Ji are silent as to pre-assigning and permanently assigned select tones in an iterative manner. There is no mention in the cited portions of Ji of pre-assigning or permanent assigning of select tones. Instead, Ji discloses that each sector has an assigned subband set and an unassigned subband set. The original assigned subband set in Ji is assigned to a sector, not to a particular user. Once the subbands are allocated to the users, beginning with the weakest, the subbands are assigned. In addition, some of the subbands in the **unassigned** set are assigned to some of the stronger users (Ji, Figure 6 and paragraph 0048). Ji does not disclose or suggest any "pre-assigning," nor does Ji disclose pre-assigning select tones to each remaining user, and then later permanently assigning to the user the same tones that were previously pre-assigned to the user, as recited by the claimed invention.

There is only a single step of assigning subbands to the users in Ji. There are not two separate steps, a pre-assigning step and a permanently assigning step, as recited in claim 1. Ji decides which users are the weakest and then assigns the subbands, starting with the assigned set, to the users, starting with the weakest user. In contrast, in the invention as claimed in claim 1, select tones are pre-assigned for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval, a remaining user having least favorable channel conditions as an active user is selected, and then the select tones pre-assigned to the active user are then permanently assigned to the active user. Ji does not teach or suggest this combination of steps. Ji determines the users with the worse quality signal metric before it

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assigns any subbands to the users. Ji does not pre-assign select tones for each remaining user, then select a user having the least favorable channel conditions as an active user, and then permanently assign the select tones that were previously pre-assigned to that user. Ji thus does not teach or suggest the limitations for which it is cited. Walton does not cure the deficiencies of Ji in this regard. Accordingly, claim 1 is patentable over the combination of Ji and Walton.

In addition, the combination of Ji and Walton does not teach or suggest performing the claimed pre-assigning, selecting, and permanently assigning steps **in an iterative manner**, as recited in claim 1. The Patent Office admits that Ji does not teach the claim limitation that the claimed steps are done "in an iterative manner," but that page 27, lines 5-6 of Walton discloses that these claimed steps are performed in an iterative manner, as recited in claim 1 (Office Action mailed June 21, 2011, p. 3-4). Applicant respectfully disagrees.

Walton does disclose a method for scheduling data transmissions and that the assignment of resources to users can be based on a number of factors, such as priority assigned to active users, fairness criteria, and channel metrics (Walton, page 31, lines 18-27). Walton also discloses "an iterative process." (Walton, page 27, lines 5-6). However, the iterative process disclosed in Walton is not the claimed iterative process. Walton does not disclose performing the claimed pre-assigning, selecting, and permanently assigning steps in an iterative manner as recited in claim 1. Instead, the iterative process in Walton is limited to "computing back-off factors" in order to reduce the "imbalance in effective link margins." (Walton, page 26, line 24 through page 27, line 8). The cited portion of Walton does not relate to the pre-assigning, selecting, and permanent assigning steps of the claimed invention. The cited portion of Walton relates to addressing the imbalance in effective link margins. The imbalance in effective link margins is reduced by iteratively computing the back-off factors. The cells and channels having higher effective link margins will have their transmit powers reduced accordingly. *Ibid.* Thus, Walton discloses an iterative process, but the iterative process is computing back-off factors, not pre-assigning tones, selecting a remaining user having least favorable channel conditions as an active user, and permanent assigning tones. Walton does not teach or suggest performing the claimed pre-assigning, selecting, and permanently assigning steps **in an iterative manner**. Since Walton does not teach or suggest this limitation, and the Patent Office admits that Ji does not teach or suggest this limitation, claim 1 is patentable over Ji and Walton for this additional reason.

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In summary, both Ji and Walton are silent as to pre-assigning select tones and then, after selecting a remaining user having least favorable channel conditions as an active user, permanently assigning to the active user the select tones pre-assigned to the active user, as recited in the claimed invention. In the claimed invention, the pre-assigning, selecting, and permanent assigning steps are done in an iterative manner until all users have been permanently assigned the select tones. In particular, in each iteration, the remaining user that has the least favorable channel conditions is selected as an active user and is permanently assigned the select tones pre-assigned to the active user. Neither Ji nor Walton discloses or suggests these limitations. Neither Ji nor Walton teaches or suggest the concepts of pre-assigning select tones, and then a later step of permanently assigning the pre-assigned select tones. There is no teaching or suggestion in Ji or Walton that multiple iterations are performed in which the remaining user that has the least favorable channel conditions is selected as an active user and is permanently assigned the select tones that were previously pre-assigned to the active user **in each iteration**, as recited in the claimed invention. Claim 1 is thus patentable for this additional reason.
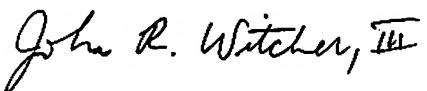
Claim 1 is patentable for the reasons set forth above. Claim 14 is an independent system claim that recites similar limitations as the limitations of claim 1. Thus, claim 14 is patentable for at least the same reasons set forth above with respect to claim 1.

Claims 2-5 and 7-13 depend from claim 1 and recite all of the limitations of claim 1. Claims 15-18 and 20-26 depend from claim 14 and recite all of the limitations of claim 14. Claims 2-5, 7-13, 15-18, and 20-26 are thus patentable for at least the same reasons set forth above with respect to claims 1 and 14.

The present application is now in condition for allowance and such action is respectfully requested. The Examiner is encouraged to contact Applicant's representative regarding any remaining issues in an effort to expedite allowance and issuance of the present application.

Respectfully submitted,

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